REMARKS/ARGUMENTS

The Examiner is thanked for the Office Action mailed September 24, 2008. The status of the application is as follows:

- Claims 1-20 are pending, claims 1, 2 and 5-8 have been amended, and claims 9-20 have been added;
- The specification is objected to;
- Claims 1, 2, 5, 7 and 8 are objected to for informalities;
- Claim 8 is rejected under 35 U.S.C. 101 as being directed to non-statutory subject matter;
- Claims 1, 2, and 4-8 are rejected under 35 U.S.C 102(b) as being anticipated by McInerney et al. ("A Dynamic Finite Element Surface Model for Segmentation and Tracking in Multidimensional Medical Images with Application to Cardiac 4D Image Analysis," J. Computerized Medical Imaging and Graphics, Vol. 19(1), pp 69-83); and
- Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over McInerney et al in view of Hill et al. ("Model-Based Interperation of 3D Medical Images." 4th British Mechine Vision Conference, pp. 339-348).

The objections and rejections are discussed below.

The Objection to the Specification

The title of the invention is objected to for not being descriptive. The Examiner suggests changing the Title from "IMAGE SEGMENTATION IN TIME-SERIES IMAGES" to "METHOD AND DEVICE FOR SEGMENTING TIME-SERIES IMAGES BASED ON ADAPTING A MESH VIA ENERGY OPTIMIZATION Applicant respectfully requests withdrawal of this objection as the Title has been amended herein in accordance with the Examiner's suggestion, with the exception that the terms method and device have not been included in the amended Title.

The specification is also objected to for missing section headings. Applicant notes that section headings are merely permissible and not mandatory (See 37 CFR 1.77(b); MPEP 608.01(a)). As such, applicant respectfully has not amended the specification to include section headings and requests withdrawal of the objection.

The Objection of Claims 1, 2, 5, 7 and 8

Claims 1, 2, 5, 7 and 8 are objected to for informalities. More particularly, the Office states that the use of the terms "first image" and "second image" in the claims is confusing in that "first" and "second" do not coincide with an ordering in time since the "second image" is generated before the "first image " Applicant respectfully traverses this objection. The use of "first" and "second" in claim 1 clearly coincides with the introduction of the images in the claim, with the latter image in time being introduced first and the former image in time being introduced second. In addition, the last "wherein" clause of claim 1 states that the second image precedes the first image in the time-series images. In light of the above, the use of the terms "first image" and "second image" is not confusing.

However, to expedite fruitful prosecution, applicant has amended **claims 1, 2 and 5** herein as suggested by the Office, using the terms "current image" and "previous image" respectfully in place of the terms "first image" and "second image." As a consequence of this amendment, the claims have been further amended to cancel duplicative limitations. For example, the last "wherein" clause which states the time ordering of the image has been removed since the terms "current image" and "previous image" provide a time ordering. In addition, the location of limitations in other "wherein" clauses has been re-positioned. The subject matter of these claims has not been changed and no new matter has been added. In view of the above, applicant respectfully requests withdrawal of the objection to claims 1, 2 and 5. **Claims 7 and 8** have also been amended herein. However, rather than replacing the terms "first" and "second" with "current image" and "previous image," the terms "first" and "second" have been reversed so that terms "first" and "second" coincide with both the order of introduction of the images and the time ordering of the images. Thus, the objection of claims 7 and 8 should be withdrawn.

Claim 6 is objected to for failing to further limit the claim it depends from. More particularly, the Office asserts that the phrase "wherein the method is a method for the automated segmentation in cardiac MRI" is a statement of intended use. Claim 6 has been amended herein to cure this objection. Therefore, the objection of claim 6 should be withdrawn.

The Rejection of Claim 8 under 35 U.S.C. 101

Claim 8 stands rejected under 35 U.S.C 101. In particular, the Office asserts that claim 8 is directed towards a computer program, which is not statutory subject matter. The Office notes that amending the claim so that the program is encoded on a computer readable medium would be statutory As such, claim 8 has been amended herein to include aspects related to the program being encoded on a computer readable medium Thus, this rejection should be withdrawn.

The Rejection of Claims 1, 2 and 4-8 under 35 U.S.C. 102(b)

Claims 1, 2 and 4-8 stand rejected under 35 U.S.C. 102(b) as being anticipated by McInerney et al. This rejection should be withdrawn because McInerney et al. does not teach each and every element as set forth in the subject claims and, therefore, does not anticipate claims 1, 2, and 4-8.

> A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. *Verdegaal Bros. v. Union Oil Co of California*, 814 F.2d 628, 631 (Fed. Cir 1987) MPEP §2131

Amended independent **claim 1** is directed towards a method comprising adapting a previous segmentation result corresponding to a previous image to an object in a current image, **based on an energy optimization that uses the previous segmentation result *and* a shape model of the current image**, to determine a current segmentation result corresponding to the current image. McInerney et al. does not describe at least the above-emphasized claim aspect.

McInerney et al. discloses deforming a segmentation balloon corresponding to an object in a previous image to the same object in a current image based on a deformation energy of the balloon. More particularly, McInerney et al discloses segmenting an object in a first image by deforming a balloon to fit the object. (See page 78, section 7.2, last paragraph; Figure 9). The segmentation balloon is based on a thin-plate material under tension and the deformation energy of the material compels the balloon to vary smoothly as it deforms to the object (See page 71, section 3, first paragraph). The same fitted balloon is used as the starting balloon for the object in the next image and deforms to fit the object in the next image based on the deformation energy

of the balloon. (See page 79, section 7.3, first paragraph). With each successive image, the previously fitted balloon is deformed to fit the object in the next image based on the deformation energy of the balloon. (See page 79, section 7.3, first paragraph).

Thus, McInerney et al. discloses fitting the segmentation balloon to the object based on an energy of the segmentation balloon. McInerney et al does not teach or suggest fitting the segmentation balloon to the object based on an energy optimization that uses the segmentation balloon ***and*** **a shape model corresponding to the current image** Since McInerney et al. does not describe each and every element as set forth in claim 1, McInerney et al does not anticipate claim 1, and the rejection of claim 1 should be withdrawn

Claim 2, which depends from claim 1, recites that the energy optimization used to adapt the previous segmentation result to the object based on the previous segmentation result and a shape model of the image, includes, *inter alia*, determining an internal energy corresponding to a first distance between the previous segmentation **and the shape model**. The Office asserts McInerney et al discloses this claim aspect on page 75 and particularly quotes "an internal pressure force is used to 'inflate' the balloon model towards the object surface." Thus, the section of McInerney et al. relied upon by the Office to teach the subject claim aspect teaches inflating the balloon towards the object, and is silent regarding a shape model, let alone determining an internal energy corresponding to a first distance between the previous segmentation **and the shape model**, as recited in claim 2. Accordingly, this rejection should be withdrawn.

Claims 4-6 depend from claim 1 and thus are allowable at least by virtue of their dependencies. Therefore, the rejection of claim 4-6 should be withdrawn

Independent **claims 7 and 8** recite limitations similar to those recited in independent claim 1. As such, the above-discussion regarding claim 1 applies *mutatis mutandis* to claims 7 and 8, and the rejection of claim 7 and 8 should be withdrawn

The Rejection of Claim 3 under 35 U.S.C. 103(a)

Claim 3 stands rejected under 35 U.S.C. 103(a) as being unpatentable over McInerney et al. in view of Hill et al. **Claim 3** depends from claim 1 and thus is allowable at least by virtue of its dependency. Accordingly, this rejection should be withdrawn

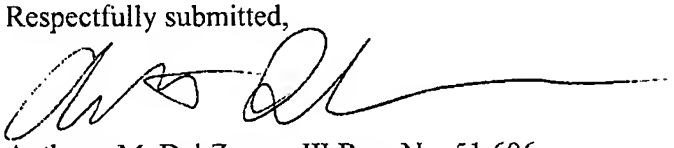
New Claims 9-20

Newly added claims 9-20 emphasize various aspects. No new matter has been added. One or more of the aspects in these claims are absent from the art of record. Entry and allowance of claims 9-20 is respectfully requested.

Conclusion

In view of the foregoing, it is submitted that the claims distinguish patentably and non-obviously over the prior art of record. An early indication of allowability is earnestly solicited.

Respectfully submitted,



Anthony M. Del Zoppo, III Reg. No 51,606
Driggs, Hogg, Daugherty & Del Zoppo Co., L.P.A.
38500 Chardon Road
Willoughby Hills, Ohio 44094
Phone: 1 440 391 5100
Fax: 1 440 391 5101

Direct all correspondence to:
Yan Glickberg, Reg. No. 51,742
Philips Intellectual Property & Standards
595 Miner Road
Cleveland, Ohio 44143
Phone: 1.440.483.3455
Fax: 1.914.323.0615